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Part I. Existing baiting and line handling systems

by A. Bjordal

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Mechanized Longlining in the Coastal Fishing Fleet

Part I. Existing baiting and longline handling systems

by

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Abstract.

The report contains a background study in connection with the project "Baiting and gear handling in the coastal longline fishery". A general description of the main principles for mechanized longline fishing is given. The report furthermore contains a short description of a total of 32 different systems for mechanized longlining, both systems that are under development and those in regular operation.

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Summary

Declining availability of baited longlines has p. 1
in recent years been a limiting factor for the activity in the coastal (inshore and near-shore) longline fishery. Mechanization of the baiting and line handling process will therefore be important for a future Norwegian coastal longline fishery.

This report contains a preliminary study aimed at recording existing solutions in this area. Components and the main principles for mechanized longlining are described. A short description of a total of 32 different mechanized systems, either under development or in regular use, is given.

The repair and maintenance process is highlighted as a general problem in both mechanized and traditional longline fishing.

1. Introduction

Insufficient availability of baited longlines is an important limiting factor today for the operation of the coastal longline fleet. It is logical to assume that this problem will become worse chiefly due to weak recruitment to the longline baiting occupation. Full or part mechanization of the baiting and longline handling process will therefore be an important precondition for maintaining the current level of activity in the coastal longline fishery.

With this background, FTFI took the initiative in 1981 to accelerate the development of mechanized baiting and longline handling systems for the Coastal fishing fleet.

Some of the systems in regular use or under development were already known to us. In order to obtain as much basic knowledge as possible, a study was carried out where about 30 systems, both Norwegian and foreign, were registered. A number of visits were made to manufacturers in order to study and evaluate various system solutions.

The purpose of this report is to give a complete overview over ideas, solutions and possibilities for mechanized longline fishing. Emphasis has been placed on presenting the main principles without giving detailed descriptions of construction and operation for each individual system.

The work was carried out with support from the Oil/ Fish Fund.

2. Principles for Mechanized Longline Fishing

Mechanized longlining can be divided into 4 operations:

Baiting, setting, hauling, and splitting and storage.

2.1 Components

A fully mechanized longline system could include the following components or functions in the various operations:

1. Baiting

a) Automatic or half automatic bait cutting

b) Automatic or half automatic baiting unit

2. Setting

a) Setting directly from baiting unit during baiting

b) Traditional setting with and without automatic setter

c) With or without automatic gangion or hook fastening.

3. Hauling

a) Roller

b) De-hooker (automatic de-hooking of fish)

c) Hook cleaner (Automatic removal of bait remnants)

d) Twist remover (automatic untangling of twisted gangions)

e) Hauler/coiler

f) Slack hauler, if used

g) Automatic repairs of hooks/gangions, if used

Splitting

a) Automatic pick up and orientation of hooks

b) Automatic gangion or hook release, if used

4. Storage

a) Storage of line, gangions and hooks as a unit or separately so that the line is ready for baiting and setting. p.5

2.2 Main principles

All mechanized longline fishing assumes that the line is made ready and magazined before setting. In order to achieve such a "product", the following operations are carried out: Hook cleaning, straightening out (untangling) gangions and repairs of defective hooks, gangions or groundline. In fully mechanized systems this process is carried out automatically with the exception of repairs, while other systems are based on these operations carried out manually.

Most mechanized longline systems are based on two main principles for baiting and storage (magazining). (See fig. 1)

Baiting:

PE - Precise (accurate) baiting: The hook is oriented and baited mechanically similar to manual baiting. Bait cutting and precise baiting are carried out in one operation for each hook that passes through the baiting unit. Baiting units of this type will generally give good baiting and can be used with most common bait types. The baiting

percentage is also relatively high, from 80 to close to 100 percent, according to system type and operator experience.

TE - Random baiting: The whole line, or only the hooks, are pulled through a chamber filled with ready-cut bait. The baiting occurs by a bait being hooked as the hook passes through the bait mass. It is arbitrary how and where the bait is being hooked, therefore the quality of baiting will be variable. With squid as bait, an acceptable baiting percentage can be reached (around 95%) with relatively good bait quality. Producers of such units will claim baiting percentages of 75% and 85% respectively for herring and mackerel, but squid will probably be the only acceptable type of bait.

Storage

SM - Rail magazine: The hooks are stored on rail-shaped magazines with gangions and groundline hanging free underneath. This type of storage provides easy access for repairs and maintenance of magazined lines. Gangion lengths and hook distances are limited to the free height between magazine and deck. Storage on rail magazines is most suitable for relatively thick lines (such as so-called banklines). Thinner lines, and especially monofilament will easily give problems in that the loops will tangle with each other. p. 6

TR - Drum: The whole line, line and gangions, or only the groundline is stored on a drum. Apart from coiling in tub, drum storage is probably the only solution for magazining monofilament line. A drum is also utilized in some systems for the storage of regular multi-filament line, but this requires a large drum capacity. Storage on drum gives compact magazining of the line, but does not make it possible to repair and maintain the line after the line has been rolled on the drum.

3. System Description

Table 1 (a-d) gives an overview of registered systems. Half-automatic or incomplete systems, and some that we only have peripheral knowledge of are also included.

3.1 Systems based on manual baiting

See Table 1a.

C. Andreassen's system

This system is designed mainly for rationalizing fishing with monofilament line. It is based on special tubs with bait holders ("chambers") and magazines for the hooks where the hooks manually are hooked on the magazine during hauling, while the groundline is coiled in the tub in the traditional way with ordinary line coilers.
The system therefore does not contain new components for

automatization of the fishery. The advantage is that the hooks are magazined in order, and that the line could be baited manually without being re-arranged. A baiter for random baiting could probably be combined with this system. p. 7

Constructed by Gottlieb Andreassen, Tromso.

Carousel

This system is developed with assistance from the White Fish Authority in England. It is relatively simple with an hydraulically driven drum for storing the baited hooks and gangions. The magazines are arranged in a turnable "carousel". The system is based on manual snap-on-and-off gangions and hooks with the help of special clips. Fig. 2 illustrates the clips and system components. Longline fishing for halibut in Alaska has long been carried out according to the same principle, so this system is only a continuation or rationalization of this type of fishing.

The Kjosnes longline system

This system is chiefly aimed at monofilament or thin lines. It is based on the spooking principle with an inner drum moving up and down as the line is being coiled on it. The hooks are being picked up and magazined on the outer rim on vertical magazines. A sketch showing the principle of the system is given in Fig. 3a. Each drum will hold about 1000 hooks. Baiting and repairs

are carried out ashore while the line is being transferred from one drum to another (Fig. 3b). The baited line can then be set directly from the drum.

Constructor: Sigmund Kjosnes, Stryn.

Miniline (Mustad)

The Miniline System was developed by O. Mustad & Son, A/S, chiefly for mechanization of longlining with monofilament line. It is based on the technique that the gangions with hooks are automatically disconnected from the groundline during hauling while the groundline is coiled up on a hydraulically driven drum. The baiting is carried out manually and hooks and gangions stored in special magazines (casettes) which make it possible to automatically fasten the gangions with baited hooks during setting. System components and operational principles are shown in Fig. 4. p. 8

Constructor/Producer: O. Mustad & Son, A/S, Postboks 72, Lilleaker.

OLFO Longline System

The system is designed for monofilament lines. It must be characterized as a rationalized system and does not incorporate increased degrees of mechanization. The main component consists of a drum for storing the groundline and a component for hooks/bait/gangions. It is made of plastic and can be mounted directly on a regular winch

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(capstan).

The line is being baited during hauling, and baited hooks are placed manually in compartments. The line should therefore be ready for setting right after hauling. The system has been partly tested by the constructor and it can be a possible alternative for certain types of longline fishing.

Constructor: Jan Fors, Olfo Slipp and Plastindustri, Hammerfest.

3.2 Systems based on random baiting

As shown in Table 1b, most systems for random baiting have been developed in Canada and USA. Most of these are based on random baiting combined with storage on rail magazines and manual splitting. Systems based on this combination will therefore be described together.

Systems with manual splitting and storage on rail magazine p. 9

Use of these systems are now becoming quite widespread in Canada (especially the east coast)and the USA. The relatively large interest in these systems is based on the following:

- Simple construction (few or no moving parts in the baiting unit)
- Relatively good baiting percentage: 90-95% for squid
- Simple to install and dismantle

- Relatively low price (kr. 20-30,000 for baiting unit and magazines)

Combined with an acceptable hauling and splitting unit, this type of system should be a practical alternative for Norwegian longline fishermen if squid is used as bait (see fig. 5).

MFC - Speedoline

This system is also based on random baiting, but has a fully automatic hauling and splitting unit, and the line is stored on short rail magazines. Two units of this type have been supplied (one to Denmark and one to Greenland), but no results regarding operational experience are available at the time of writing.

Producer: M.F.C. Manufacturing Ltd, Galway, Ireland.

Autosnapper

The Autosnapper system consists of baiting unit, hydraulically driven drum for the storage of groundline, and magazines for the storage of hooks and gangions. The system is based on special clips for fastening gangions and hooks to the groundline (compare with the Carousel system). Clips and operational principles are shown in Fig. 6. The bait compartment is constructed so that only the hook is hauled through the mass of bait while gangions and groundline are outside. Snapping the gangions on and off manually result in relatively low setting speed (ca. 2 knots), while the

hauling speed is the same as in normal longline fishing. However, the system requires a relatively high labor input on board in order to straighten out and magazine the hooks and gangions. p. 10

Producer: Shields Ind. Inc., Vancouver, Canada

Importer: MSCI, P.O. Box 230, 6065 Ulsteinvik

MARCO - TiLiner

The Ti-Liner system is based on storage on drums with manual magazining of the hooks. They are threaded on to spokes on the edge of the drum during hauling. The line is set directly from the drum which is connected to the baiting unit. The components of the system are shown in Fig. 7.

Producer: MARCO, Seattle, Washington, USA

The Delta Longline System

The system is based on automatic snapping on of hooks and gangions. The details of the system are not yet known to us.

Producer: NOVA & Co, Manchester by the Sea, Mass, USA

3.3 Systems based on precise or accurate baiting.

See Table 1c. Most of these systems include automatization of the whole line handling process. However, the pairs and bait feeding are manual operations.

Autoline_

Mustad Autoline consists of a hauling unit with hook cleaning, twist remover and splitting of the line which is stored on rail magazines, and an automatic baiting unit. The components in the system are shown in Fig. 8. Autoline is the only fully automatic baiting and line handling system that can show any positive operational results up to now. Of about 150 installations sold, close to 100 are in operation on Norwegian longline vessels. p. 11

Autoline is chiefly designed for larger vessels that carry out longlining on a 12 month basis since the system requires a relatively large space and represents a relatively high investment cost. Work is underway to adapt Autoline to vessels down to 35 feet in length.

Producer: O. Mustad & Son A/S, P.O. Box 79, Lilleaker, Oslo.

Java_Longline System.

The system is designed for fully automatic operation. It consists of a hauling and splitting unit, rail magazines for storage and a baiting machine for accurate baiting. The system can be adapted for vessels down to 35 feet in length. The main components of the system is shown in Fig. 9.

A unit of this type was tested in 1981 and the main conclusion was that splitting and baiting would need

to be improved.

Producer: Jardar Vartdal, Orsta

Precision Baiting Machine

This baiting machine has recently been developed. It carries out baiting operations similar to Mustad Autoline, but the construction is simplified. The baiting capacity is given as at least 1 hook per second. A hauling and splitting unit is under development.

Producer: Midwater Services Inc., Snohomish, Wash., USA

Sari Longline System p. 12

This system is basically similar to the JAVA - longline system and is therefore fully automatic with hauling and splitting unit, storage on rail magazine and baiting unit. Both the hauling and baiting units are changed from the Java System. This system could be used on vessels down to 30-35 feet in length. The system is shown in Fig. 9.

Producer: Samal & Co., Bergen, in cooperation with Lorentzen Mechanical & Hydraulic Shop, Kabelvag.

Trio Baiting Machine

The Trio Baiting Machine is constructed for accurate baiting. A few units of this baiting machine were built and were used with varying results in the first stage of

development for mechanized longlining. However, the production of the Trio machine was terminated.

Constructor and Producer: Trio Engineering, Stavanger

Autoclip

The WFA - Autoclip system consists of automatic baiting unit, drum for storage of groundline, and magazines for storage of hooks and gangions. The system is based on automatic snap-on and snap-off gangions and hooks, respectively while hauling or setting the line. This is made possible by the use of special nylon clips. These, and the system in general, are shown in Fig. 10.

The system was developed with assistance from Sea Fisheries Industry Authority (earlier White Fish Authority) in England, and has gone through a long trial period. However, the system is not yet in commercial operation.

Constructor: Sea Fisheries Industry Authority, Ind., Div. Unit, St. Andrews Dock, Hull, HU3 4QE, England.

Turboline

This system is fully automatic and is based on automatic splitting off and re-attaching the hooks with the help of a special locking mechanism between hook and gangion. The hooks are split off during hauling, and the groundline and gangions are stored on special drums. The automatic baiting unit gives precise baiting by the hook being

"shot" through the bait and fastened to the gangions again during setting. This system therefore represents a completely new principle in longline automation. Components and working principles are shown in Fig. 11.

Constructor/producer: Bjorshol International Langoyneset.

Hovring Baiting machine

This baiting machine is designed for automatic baiting and coiling of the line in tubs, based on an already magazined line. The magazine is shown in Fig. 12. A prototype was developed as a cooperative effort by the constructor and FTFI. However, the operational trials did not give satisfactory results and the development work was not carried further.

Constructor: L. Hovring, Karmoy

Stranda longline system

This system, which is under development, consists of an automatic hauling and splitting unit with the coiling of the line in tubs and magazining the hooks on short magazines attached to the tub. During setting, the magazine is coupled to the baiting unit and the line is set directly from the tub via the baiting machine, with an estimated setting speed of about 2 hooks/second.

The unit is constructed for vessels from 25 to 40 feet in length.

Producer: Stranda Motorverksted, Langoyneset

3.4 Other Systems

Automatic coiling system

This system should be able to carry out automatic laying and or coiling of ready baited longline in tubs. It is under development and as of when this was written, no further information was available on the construction and operation of the system.

Constructor: Age Albrigtsen, Kvaloysletta (Tromso)

Gang-Baiter

This system also gives precise baiting, but with a completely different principle than the systems described in section 3.3. In its present stage of development, the system consists of a baiting unit and special rail magazines for storage. The components are shown in Fig. 13.

The operational principle is based on a special plastic tab on the end of the hook (Fig. 13a) in order for the hooks to be magazined as shown in Fig. 13b. One or more rows of hooks can be baited in one operation. Whole lengths of squid, mackerel, etc., are placed on "forks" which thread the bait on the hooks. The bait is then cut across the rows of hooks in the next operation. The baiting can be carried out half automatic or manually, and the baiting time for a tub (320 hooks) will respectively be

about 5 and 10 minutes.

The system represents a very good solution for baiting according to a new and unique principle. Setting of multi-filament lines is without special problems. p. 15 However, no hauling and splitting unit has been developed so clearing and magazining must be carried out manually. The way the system is today, the hauling speed will be relatively low and limited by the magazining speed.

Producer: NORDCO, Ltd., St. John's, Newfoundland, Canada

The Jorgensen - Dahl System

This system is chiefly designed for monofilament lines and should be able to carry out the following functions: Automatic hauling, splitting and magazining of the line on a drum. Both hooks, gangions, and groundlines are spooled on to the drum during hauling. The line can then be set directly from the drum. A device for automatic repairs and maintenance is under development. However, no special baiting unit has been developed, but the system can be combined with a unit for random baiting. A section of the system is shown in Fig. 14.

Producer: ISI - FISK, O. Akerv. 68, Oslo 5.

4. Repairs and Maintenance

Repairs of broken gangions or damaged hooks is still a manual operation in most systems for mechanized

gear handling in the longline fishery. For systems with storage on rail magazines, the line is available for repairs and it must be repaired before setting. Lines stored on drums must not necessarily be repaired before setting, but if it is to be repaired during continuous fishing, this must be done before the line is spooled on the drum. For all longline fishing, both traditional and mechanized, repairs are a relatively labor intensive process and for fully mechanized systems the repair and maintenance operation represents most of the manual input in handling the gear. There is, therefore, a general demand for simplifying the repair process in the longline fishery, regardless of the type of system used.

For some systems (for instance the Jorgensen-Dahl system), the aim is to develop an automatic repair unit. p. 16
Samal & Co. has developed a special split swivel (Fig. 15) which will probably simplify repairs considerably, especially for monofilament line. This or similar rapid repair systems should be introduced in all forms of longline fishing in order to rationalize repairs.

5. Discussion

As shown in the description of the systems, there are a number of alternative solutions for rationalizing the longline fishery. Active work is also underway on new ideas and improvements of existing systems. Conditions

should therefore be favorable for making the traditional coastal longline fishery more efficient.

However, the coastal longline fishery represents very large variations with respect to vessel size, gear types and fishing methods. A system that should satisfy the various requirements of the Norwegian coastal longline fishery must therefore be very flexible and adaptable.

The typical coastal longline fishery can briefly be described as follows: Vessels from 25 to 70 feet, where the hydraulic coiler is the only mechanical aid used for the longline handling process. Setting and hauling is carried out on board while the rest of the gear handling (maintenance and repair of the line) and baiting operations, are carried out manually ashore.

With basis in the traditional fishing pattern in the coastal longline fishery, it would first be natural to introduce automatization in the hauling and splitting process. A simple splitting machine is really only a further development of the coiler. While the coiler delivers the whole line into a tub, a splitting and hauling unit with hook cleaning and washing of the line give the following "product": Clean line and clean hooks, ready on magazines. A line in this form can: a) be baited in the traditional way ashore. It is expected that considerable time will be saved in the traditional baiting and line handling process if the baiters can take the line directly from magazines instead of hauling and straightening

p. 1

out the line from the tub. (From experience, it is estimated that the baiting time will be halved by baiting from magazined line).

b) can be used with most types of automatic baiting machines. Introduction of hauling and splitting units in the coastal longline fishery will therefore be of considerable importance regardless of if the system is based on manual or automatic baiting. By developing separate units for hauling, splitting and baiting, the fishermen will also have a possibility to themselves decide which degree of automation they will have and at the same time give a smoother change from traditional to half - or fully mechanized longlining.

Table 1. Different longline systems, arranged according to principles for baiting, splitting and storage. The following abbreviations are used: ST = Tub, TR = Drum, SM = rail magazine, U = System under development, D = system in operation with approximate number of installations in brackets.

* se side = see page
lagring = storage
Norge = Norway

Tabell 1a Systemer basert på manuell egning
(Systems for manual baiting)

System			Splitting	Lagring*	Status	Se side*
1	Andreassen	Norge *	manuell	ST	U	6
2	Carousel	England	manuell	TR	-	7
3	Kjøsnes	Norge	automatisk	TR	U	7
4	Miniline	Norge	automatisk	TR	U	7
5	Olfo	Norge	manuell	TR	U	8

Tabell 1b Systemer basert på tilfeldig egning.
(Systems for random baiting)

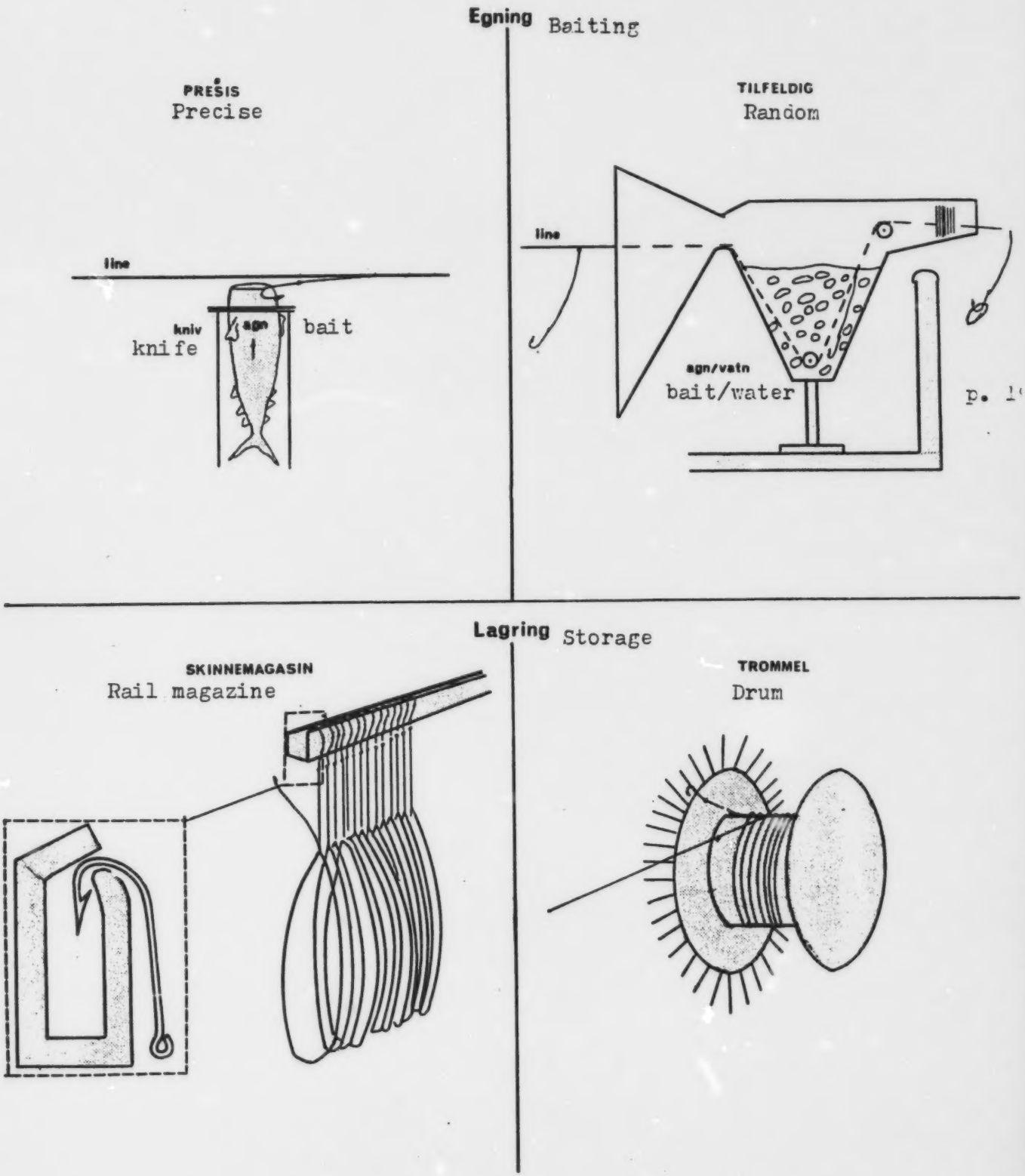
System			Splitting	Lagring	Status	Se side
1	Bruce Bariter Syst.	Canada	manuell	SM	D (?)	9
2	Burry Easy Slide	Canada	manuell	SM	D (?)	9
3	C & W Baiter Syst.	Canada	manuell	SM	D (?)	9
4	Global Baiter II	Canada	manuell	SM	D (25)	9
5	I.M.P.Baiting Syst.	Canada	manuell	SM	U	9
6	Jennex Bait.Syst.	Canada	manuell	SM	D (100)	9
7	King Fisher	Canada	manuell	SM/ST	D (?)	9
8	Sea Horse LonglSyst.	USA	manuell	TR	D (?)	9
9	Simplex Longl.Syst.	Canada	manuell	SM	D (?)	9
10	Alaska Longl.Syst.	USA	manuell	SM	D (60)	9
11	M.F.C.Speedoline	Irland	automatisk	SM	D/U	9
12	Autosnapper	Canada	manuell	TR	U	9
13	Delta	USA	?	?	U	10
14	Marco TiLiner	USA	manuell	TR	D (60)	10

Tabell 1c Systemer basert på presis egning.
(Systems for precise baiting).

System			Splitting	Lagring	Status	Se side
1	Autoline	Norge	automatisk	SM	D (150)	10
2	Japansk Syst.	Japan	automatisk?	SM?	U	
3	Java Longl.Syst.	Norge	automatisk	SM	U	11
4	Precision Baiting	USA	manuell	SM	U	11
5	Samal	Norge	automatisk	SM	U	12
6	Trio egnemaskin	Norge	-	SM	-	12
7	Autoclip	England	automatisk	TR	U	12
8	Turboline	Norge	automatisk	TR	U	13
9	Høvring	Norge	-	SM	-	13
10	Stranda	Norge	automatisk	ST	U	13

Tabell 1d Andre systemer
(Other systems)

System			Splitting	Lagring	Status	Se side
1	Albrigtsen	Norge	-	ST	U	14
2	Gang-Baiter	Canada	manuell	SM	U	14
3	Jørgensen-Dahl	Norge	automatisk	TR	U	15



Figur 1. Hovedprinsipper for egning og lagring av line.
(Main principles of baiting and line storage).

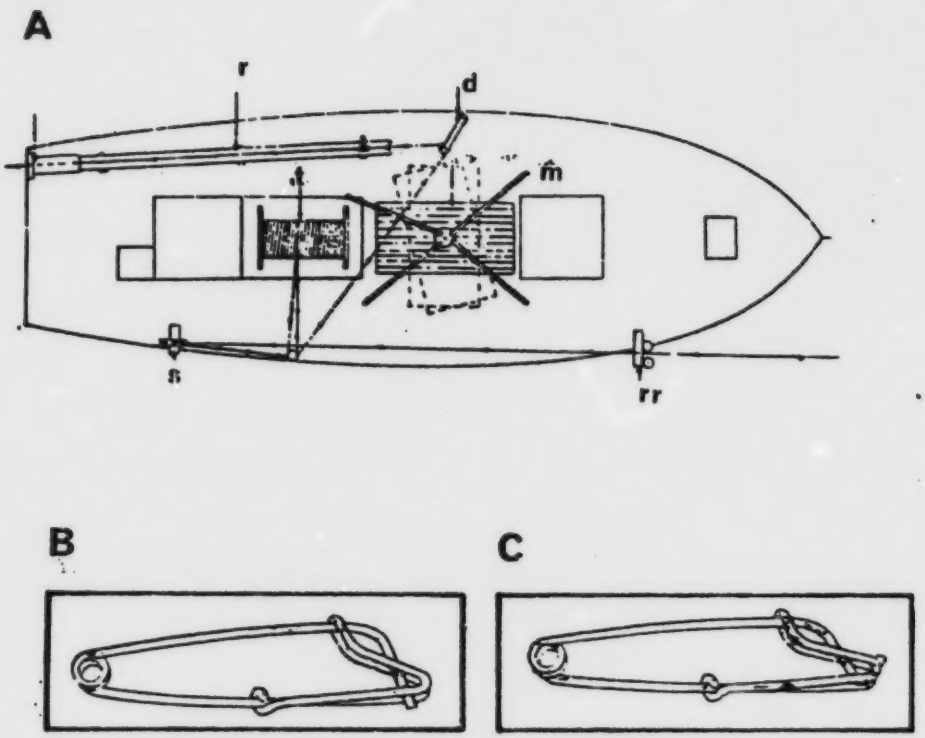


Fig. The Carousel System

A. Deck arrangement

d - davit

m - magazine (carousel) for baited hooks, gangions and clips

r - tube

rr - rail roller

s - winch, capstan

t - drum for storing groundling

B. Clips (Luhr Jensen, LJ70 for 7 - 12 mm line)

C. " " " " 72 " 5 - 7 " ")

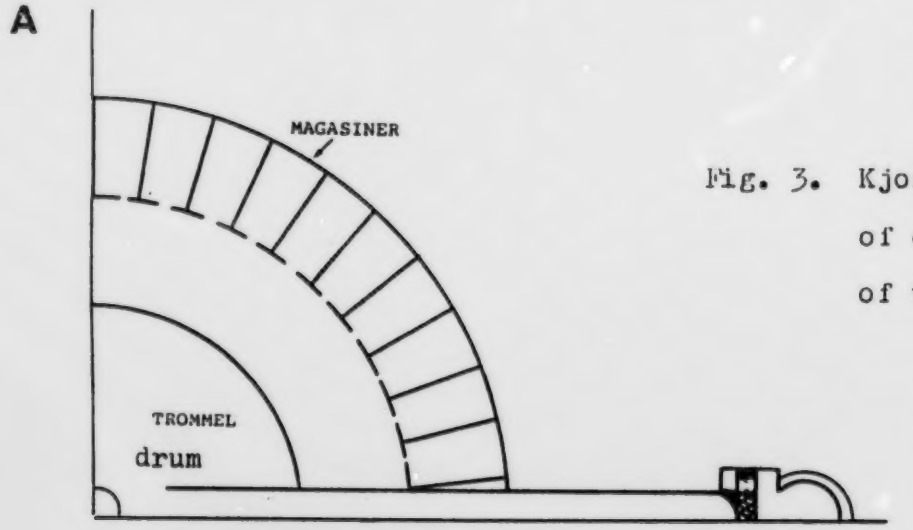


Fig. 3. Kjosnes longline system. A) Section of drum seen from above. B) Sketch of the principle for repairing and baiting.

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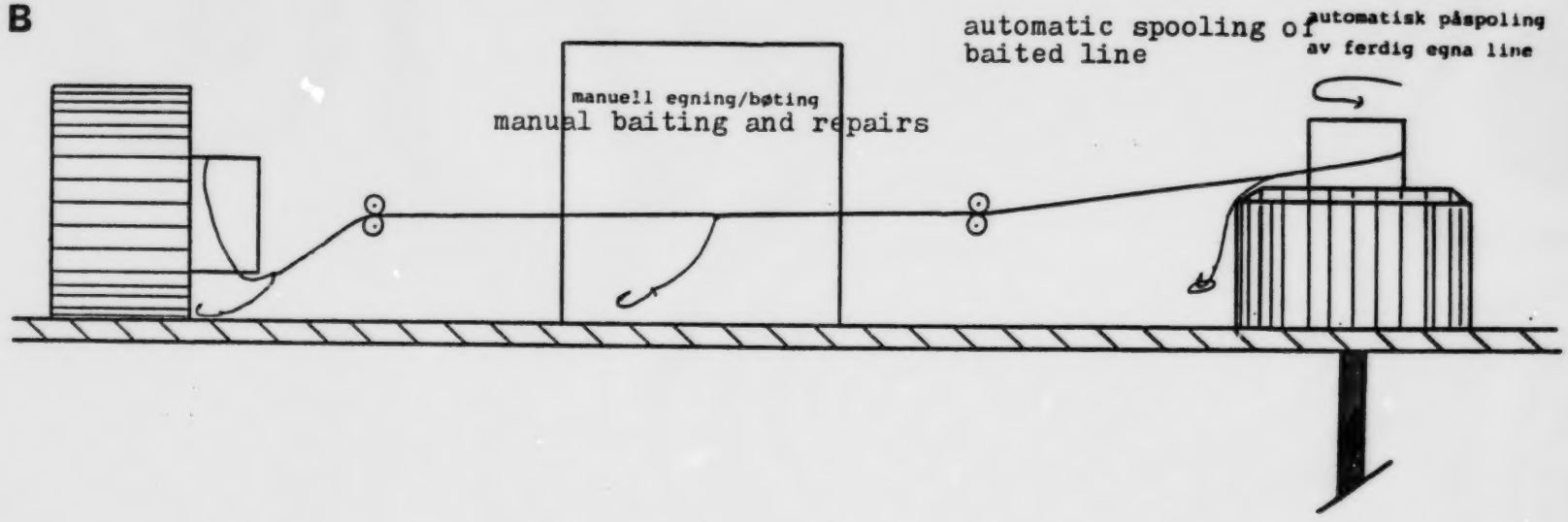
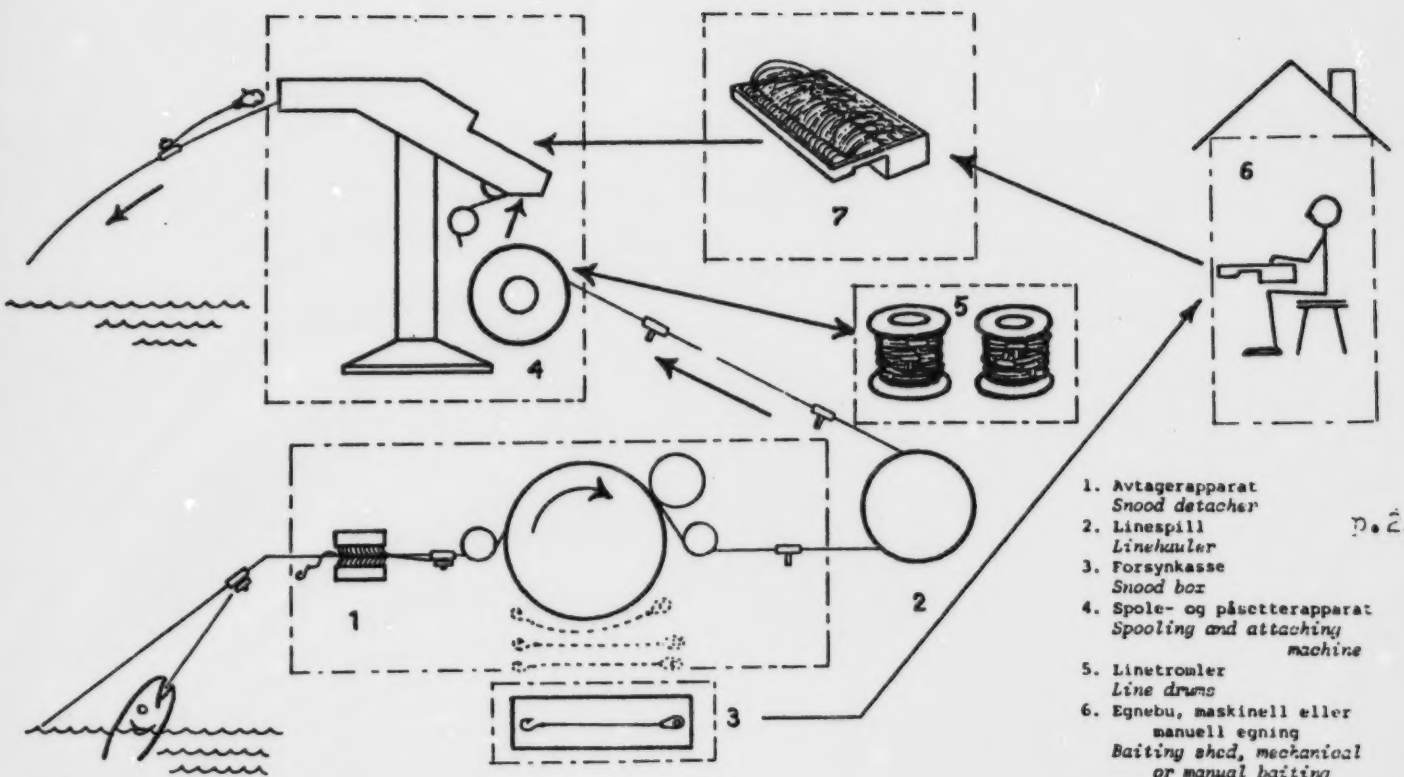
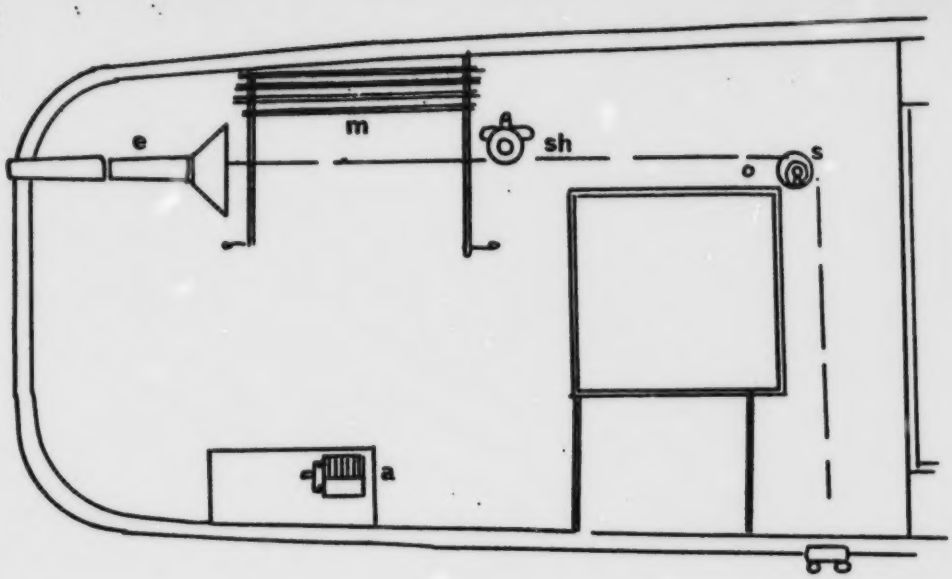
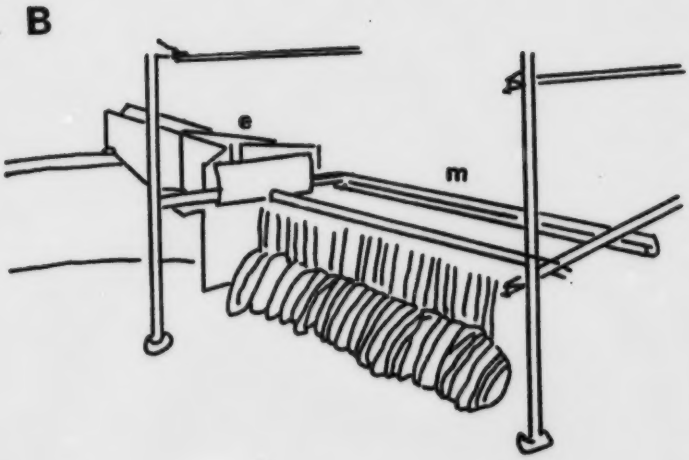


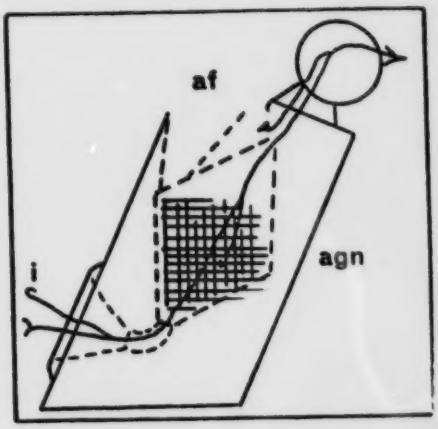


1. Avtagerapparat
   Snood detacher
2. Linespill
   Linehauler
3. Forsynkasse
   Snood box
4. Spole- og påsetterapparat
   Spooling and attaching machine
5. Linetromler
   Line drums
6. Egnebu, maskinell eller manuell egning
   Baiting shed, mechanical or manual baiting
7. Kasetter med egnede forsyn
   Cassettes with baited snoods.

Fig. 4. Mustad Miniline System.
Funksjonsprinsipp/systemkomponenter.







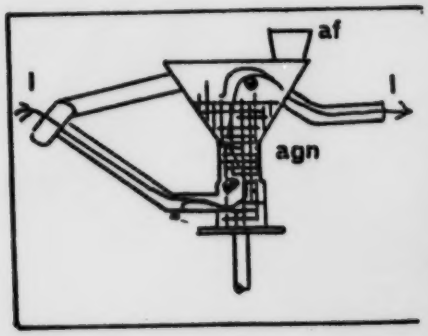
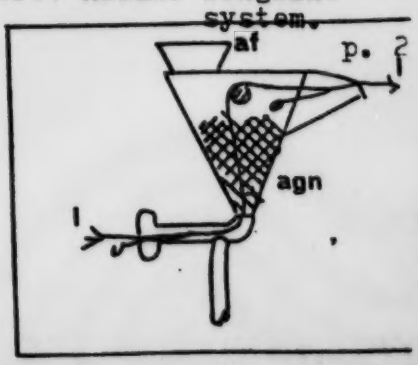
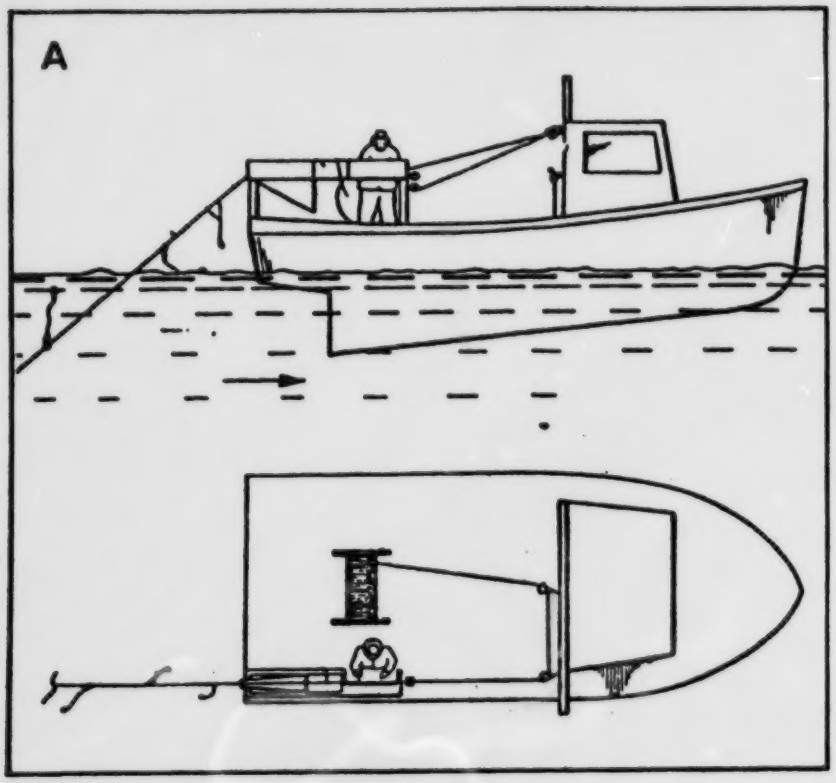


Fig. 5. Various systems for random baiting
A. Deck Arrangement (here: Alaska longline system.
a = bait cutting machine
b = baiting unit
m = magazines on rack (frame)
s = winch (capstan)
sh = slack hauler
B. Storage on rail magazine and baiting unit (here: Alaska longline system.
C. Baiting unit (Jennex Baiting System)
D. Baiting unit (Burry Random baiter)
E. Baiting unit (Bruce Random baiter)
l = line
af = bait filling
agn = bait





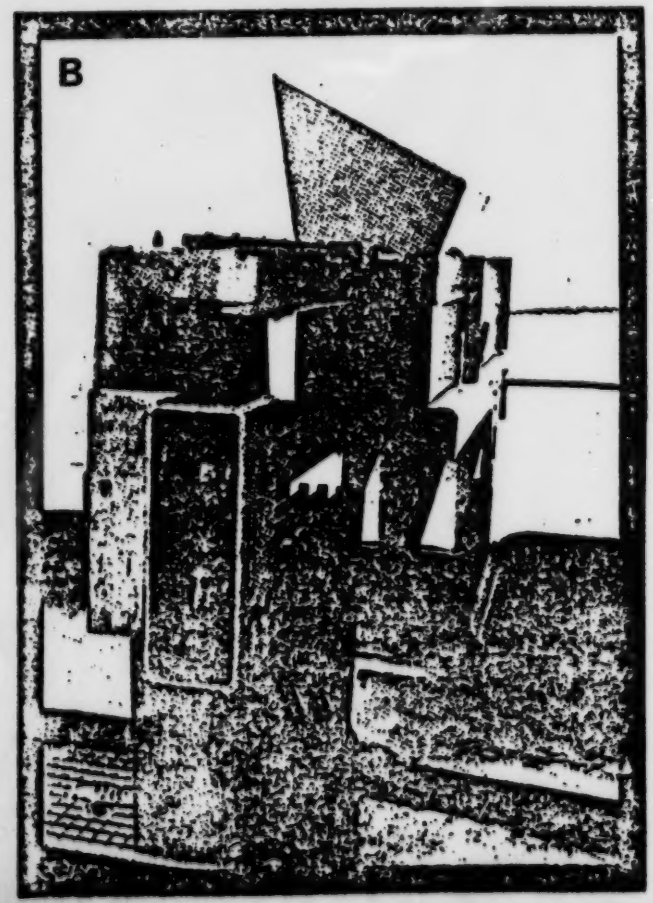


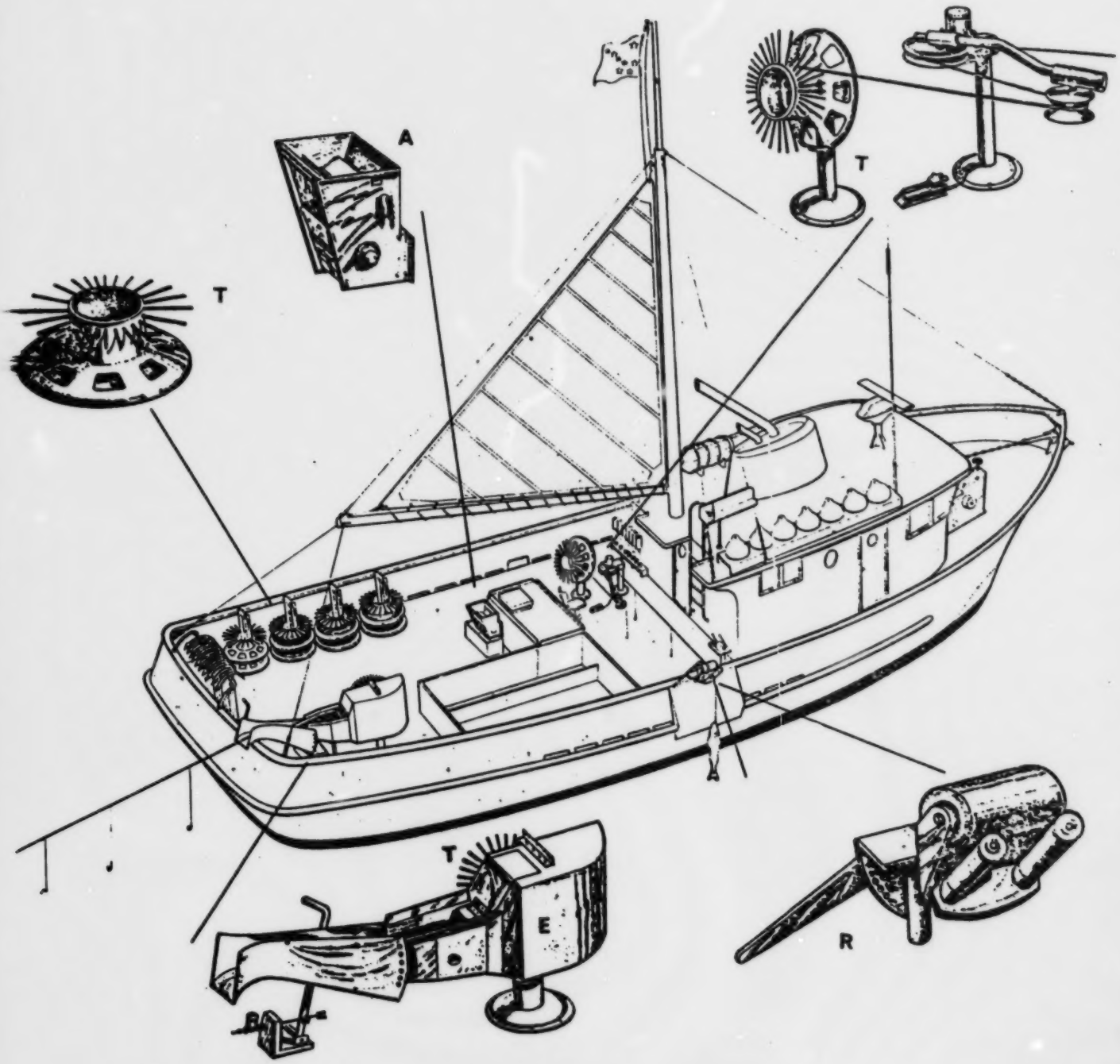
Fig. 6. Autosnapper p. 24

A. Deck arrangement and operating principle

B. Baiting unit seen from the front

C. Clips (natural size)

Fig. 7. Marco Ti-Liner, components and deck arrangement p. 25



A) Bait cutting E) Baiting and setting unit
R) Movable rail roller T) Drum

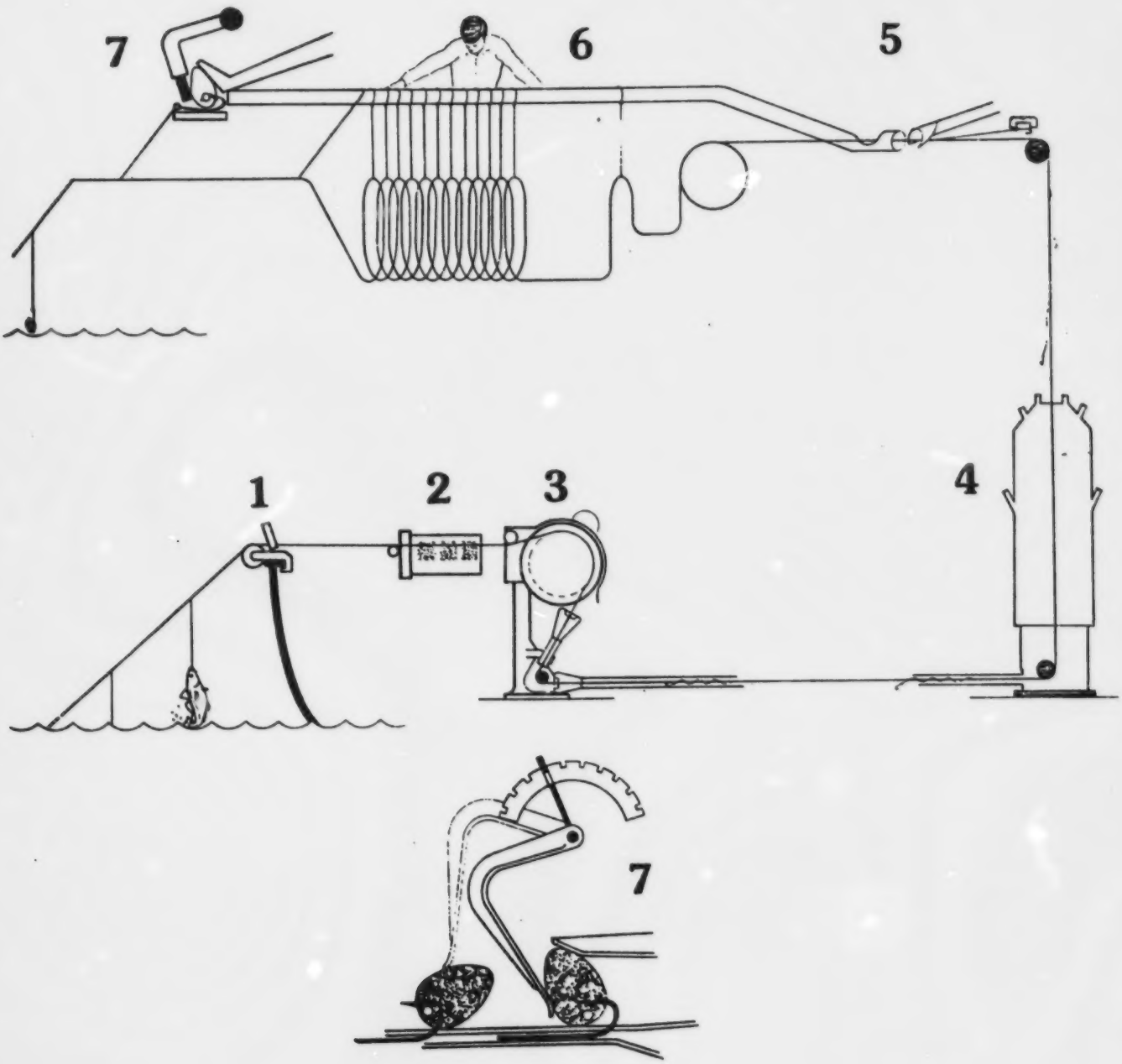


Fig. 8. Mustad Autoline System

Operating principle and system components p. 26

1. Rail roller
2. De-hooker and hook cleaner
3. Line hauler
4. Twist washer
5. Splitting machine
6. Rail magazines
7. Baiting unit (precise baiting)

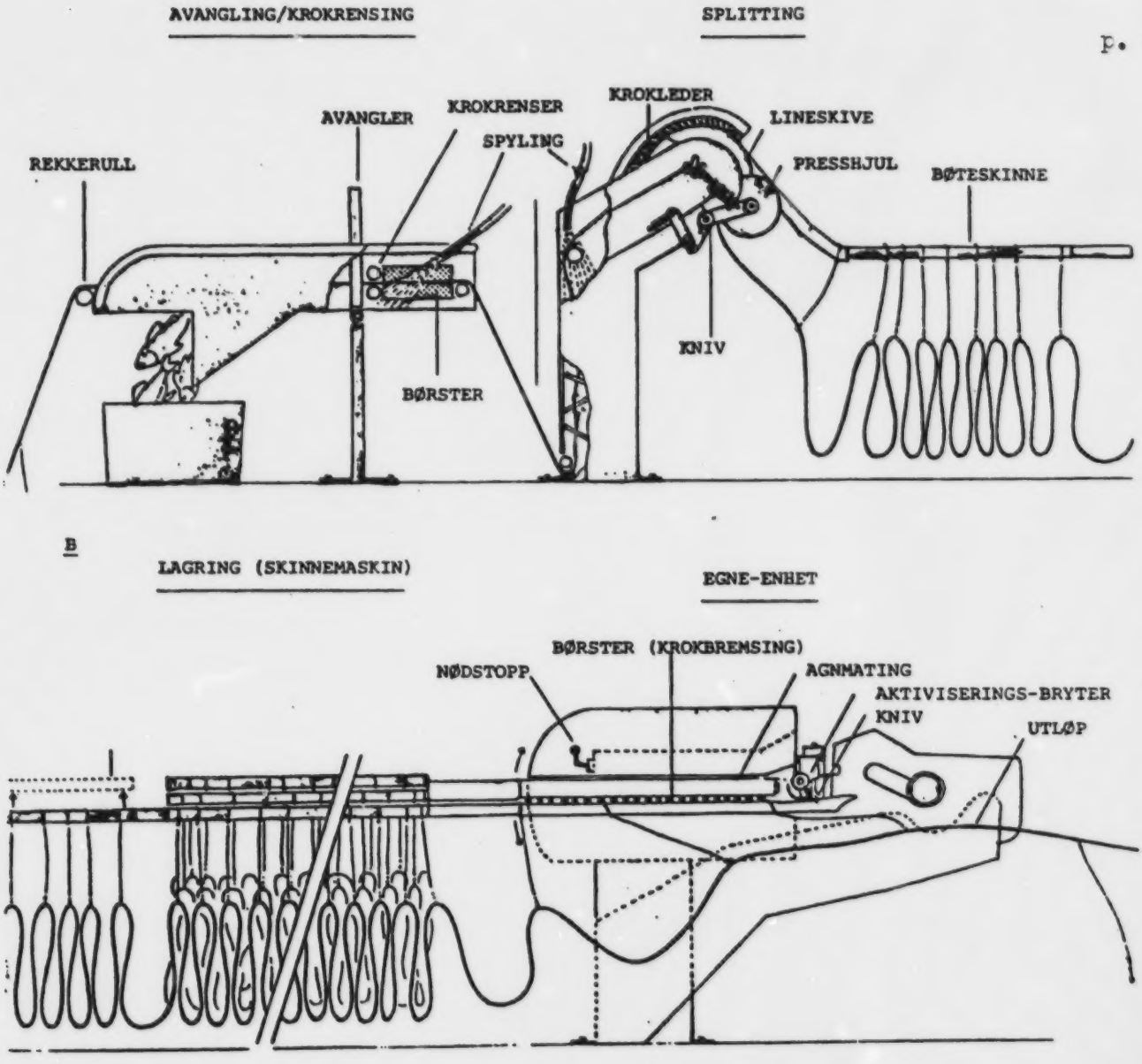


Fig. 9. SARI linesystem (JAVA linesystem)
(SARI longline system)

A. Avangling/Krokrensing = De-hooking/Hook cleaner

Rekkerull = rail roller

Avangler = de-hooker

Krokrenser = hook cleaner

Spyling = washing (hosing)

krokleder = hook guide

lineskive = line disc

Presshjul = Press wheel

Boteskinne = repair rail

Borster = brushes

kniv = knife

B. Storage (rail magazine)

Nödstopp = emergency stop

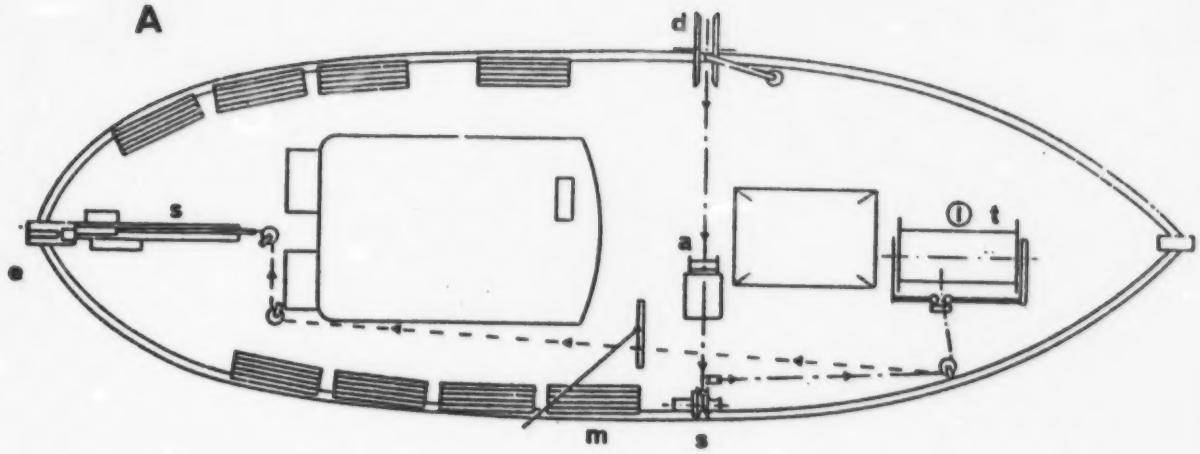
Börster (krokbremsing) = Brushes (hook braking)

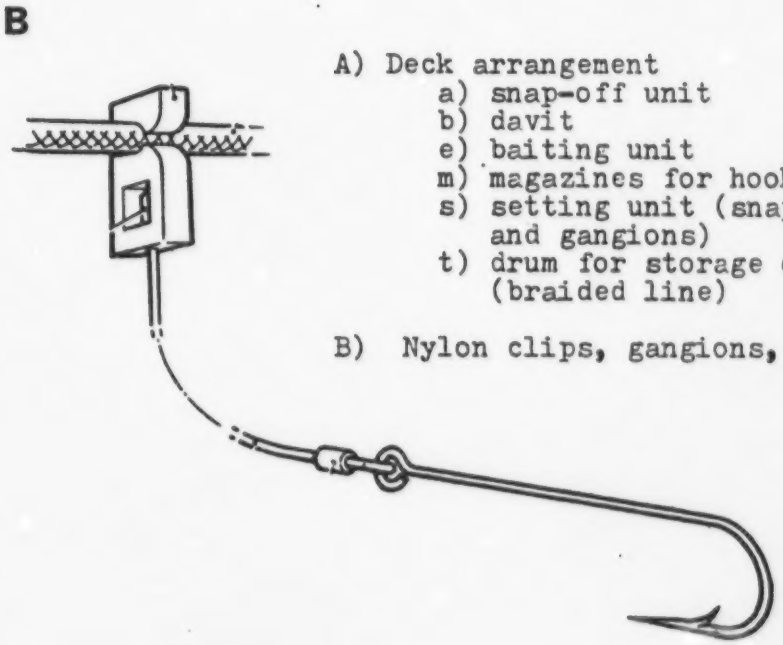
Agnmating = Bait feeding

Aktiviserings - Bryter = activating switch

Kniv = knife

Utlöp = outlet





A) Deck arrangement
- a) snap-off unit
- b) davit
- e) baiting unit
- m) magazines for hooks & gangions
- s) setting unit (snap on of hooks and gangions)
- t) drum for storage of groundline (braided line)

B) Nylon clips, gangions, hooks.

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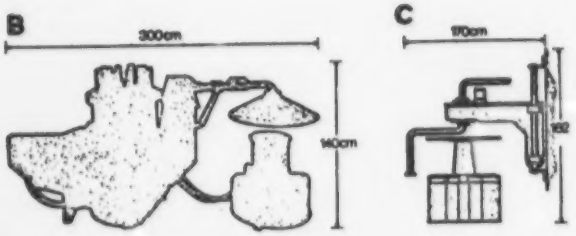
Fig. 10. WFA - Autoclip

A Hovedprinsipp.
Kroken "skytes baklengs" inn på agnet og kombinert svivel/ kobling.

A. Main principle
The hook is "shot backwards" into the bait and combined swivel/ coupling.
B

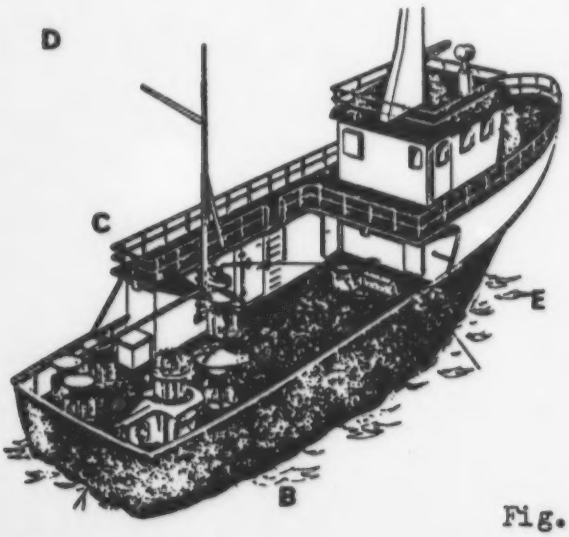


B Egne/sette-enhet

B. Baiting & setting unit

C Magasinering på trommel

C. Magazining on drum



D Dekksarrangement

D. Deck arrangement

Fig. 11. Turboline

T = drum E = hauling and snap off unit

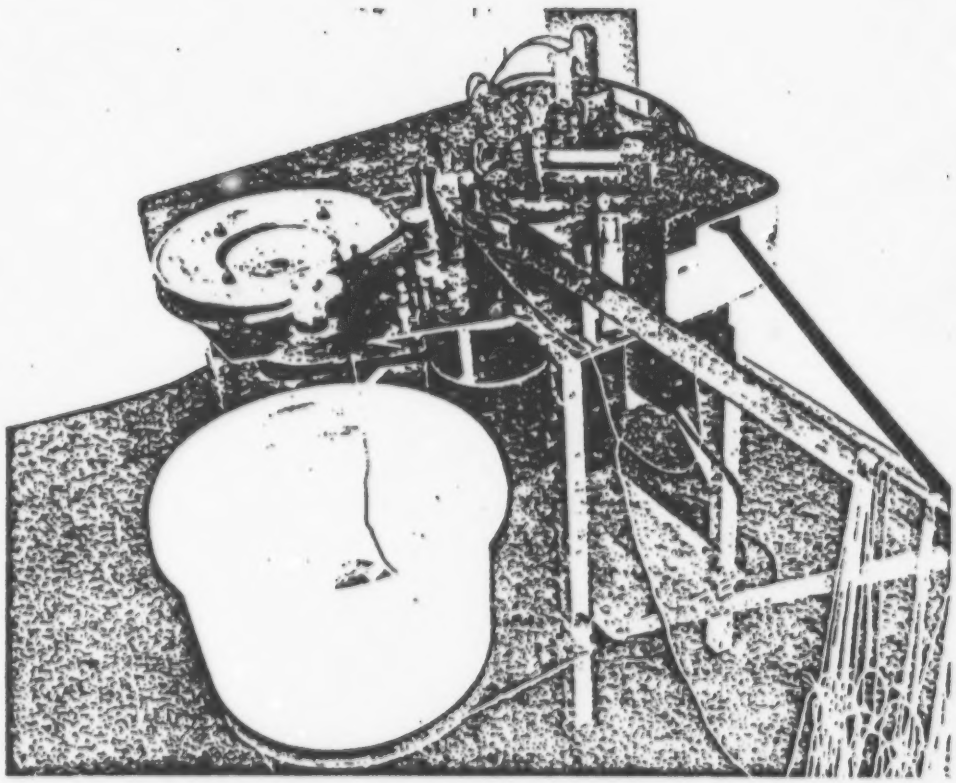


Fig. 12 . Høvrings line-egnemaskin for kveiling i stamp.
(Høvring baiting machine).

Fig. 12. The Hovring longline baiting machine for coiling in tub.

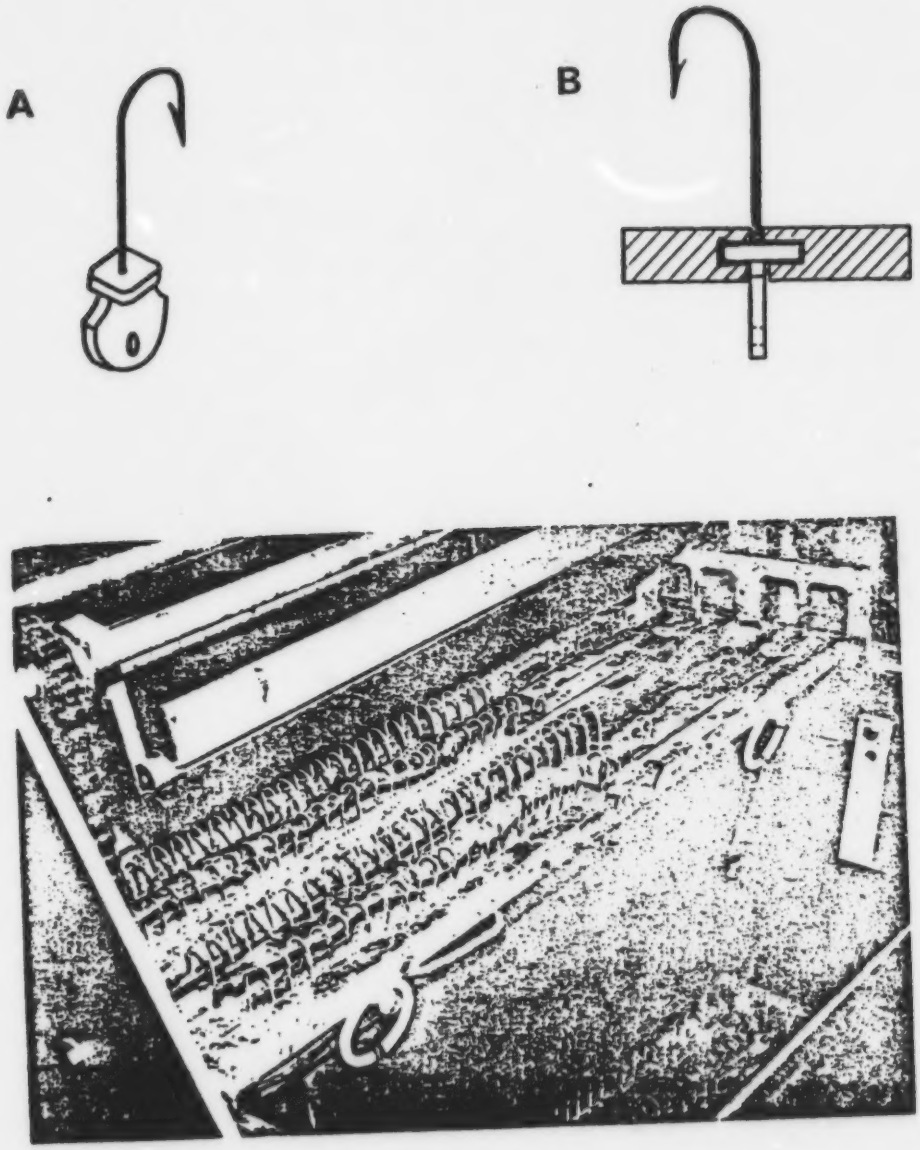


Fig. 13. Gang Baiter p. 31

A. Hook with "plastic tab"

b. Cross section of magazine with hook

C. Magazine with hooks on the top of the "tub". From the baiting process - half the rows of the hooks have been baited.

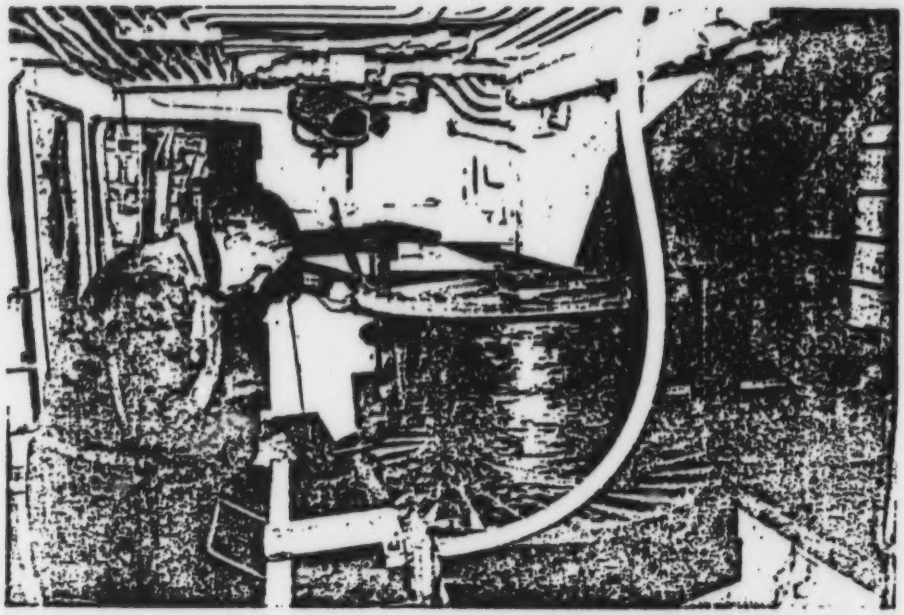


Fig. 14. Jørgensen Dahls linesystem for automatisk haling, splitting og magasinering av monofilamentline.

(Jørgensen-Dahl longline system).

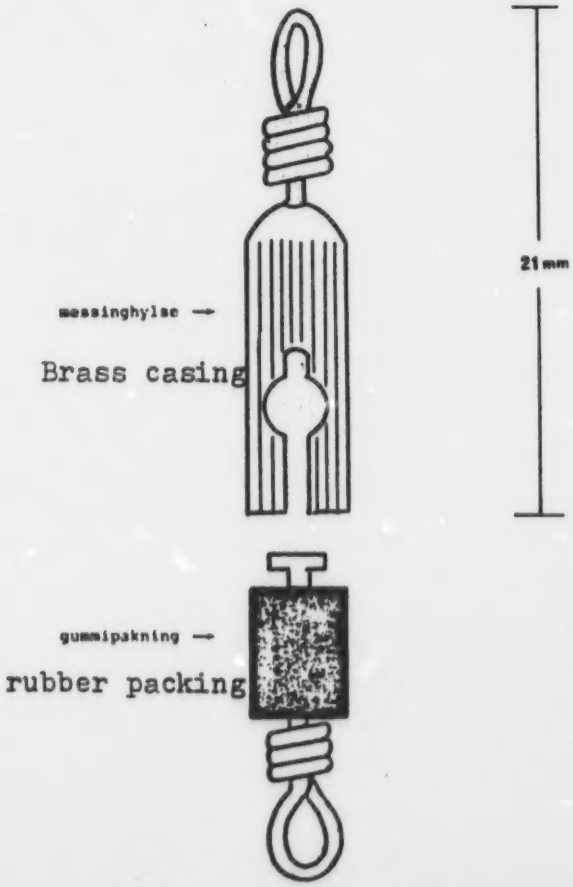


Fig. 14. The Jorgensen Dahl longline system for automatic hauling, splitting and magazining monofilament lines.

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Fig. 15. Splitt-svivel
(Split-swivel)